Architects Forum Meeting

Date / Time:	04 July 2024, 14:00
Agenda:	https://indico.cern.ch/event/1354958/
Present:	Predrag Buncic, Giulio Eulisse, Graeme Stewart, James Letts (CMS), P. Srimanobhas (CMS), James Catmore (ATLAS), Vincenzo Eduardo Padulano, Valentin Volkl, Andre Sailer, Marco Clemencic
Remote:	Alberto Ribon, John Chapman (ATLAS), Pere Mato, G Ganis, Simone Campana (WLCG), Andrea Valassi
Excused:	Maria Girone, Lorenzo, Axel
Next meeting:	29 August 2024, 14:00

Announcements and upcoming events	
Draft minutes of the last meeting can be found here. The minutes of the previous meetings can be found here.	
1-4 July 2024	PyHEP 2024 Users Workshop (online)

26-30 August 2024	PyHEP.dev 2024 Developer's Workshop
9 – 13 September 2024	XRootD and FTS Workshop @ STFC, UK
16-18 September 2024	CernVM Workshop (CERN)
30 September - 4 October 2024	JuliaHEP Workshop 2024 (CERN)
7-11 October 2024	29th Geant4 Collaboration meeting in Catania (Italy)
19-25 October 2024	CHEP 2024 (preceded by HEP Training event)
25-26 November 2024	2nd ROOT Hackathon at CERN Idea Square

SFT Line Management
Arrivals • Martin FØLL, ROOT Doctoral Student cofund with Univ Oslo • Jolly CHEN, NGT 1.7 Doctoral Student • 17x MS+NMS+OpenLab summer students *Recently closed selection processes*

- LD
  - EP-SFT-2024-55-LD, Scientific Software Engineer - Data Analysis, ROOT; starting Sept 1st
  - EP-SFT-2024-41-LD, Lead Software Engineer - Machine Learning, NGT; starting Oct 1st
- GRAP for NGT WP 1
  - ML Software Developer for FPGA (T1.2) (EP-SFT-2024-47-GRAP); starting Sept 1st
  - tSoftware Developer for ML Training (T1.3) (EP-SFT-2024-48-GRAP); starting Sept 1st

Openings still to be finalized (starting date to be fixed)

- Parallel-GPU Software Developer on ROOT/EP R&D (EP-SFT-2024-37-GRAP)
- Doctoral Student for NGT 1.7
- Technical Student for NGT 1.2

To be reopen

- QUEST, Data Analysis Tools Developer on ROOT (ex EP-SFT-2024-35-GRAP)
  - Selected candidate withdrawal

Report from the SFT Projects

ROOT	2nd quarterly report (26.10.2024): https://indico.cern.ch/event/1402903/ ● All LHC experiments present ● Next steps towards development release in November agreed ● 2025 Release Schedule will depend on LHC Run 3 schedule (data taking in 2026?). Baseline is a data taking release in May 2025. Effort: ● QUEST EP-SFT-2024-35-GRAP: short-notice decline of position by the candidate (contract already signed). Release 6.32.02, released on time as agreed at the LIM: ● Tag https://github.com/root-project/root/releases/tag/v6-32-02 ● ROOT compatible with Python 3.13 ● Fixed performance regression in ALICE event generation ● Fixed memory leak in cppyy affecting ATLAS ● Fixed bug in LLVM affecting LHCb headers inclusion Release 6.30.08 ● Delivered within 24h after LHCb request ● Fixed interpreter behaviour affecting LoKi (and potentially similar codes) when interpreted

Integration and Platforms:

- Macos 15 Sequoia beta is already included in ROOT's CI to prepare for the official release in October (following previous years' Apple schedule)
- Added new build flavours for nightlies and PR builds: march=native (on x86), Alma9+clang, Debian 12. Objective: increase coverage dramatically for the benefit of stability leveraging the power of the GitHub CI and CERN's cloud infrastructure.

Conda:

- Pushed ROOT 6.32.00 to the conda channel, work ongoing for 6.32.02
    - Effort ongoing to support variants of ROOT builds (e.g. a build with GPU support for RooFit)
- conda nightly being built via github actions, will help to make integrations of new ROOT versions smoother

Simulation	● The second patch of the latest Geant4 version, 11.2.2, was released on June 21st. ● The beta release, 11.3.beta, was released on June 28th. Some highlights: ○ First full implementation of sub-event parallelism, with creation and processing of sub-events in workers, and merging of results back into events on the main thread. ○ First implementation of parallel initialisation of geometry optimisation. ○ Updates to cross-section classes to rationalise initialisation of data in MT mode (a necessary step towards the parallel initialisation of electromagnetic physics). ○ New revised and optimised implementation of G4GenericTrap shape (which is used for the new implementation of the geometry of ATLAS EMEC). ○ Improved/optimised implementation of GetCubicVolume() in Boolean solids. ○ Added new classes for automatic field construction from parameters (to ease the possibility for users to change the default parameters of field and integration). ○ Added three new variants of the 'Shielding' physics list in G4PhysListFactory, based on the G4LightIonQMDReaction model. ○ Introduced optional neutron treatment of the Unresolved Resonance Region (URR) via Probability Table (PT), in neutron-HP, relevant for precise simulations of nuclear reactor criticality and shielding applications. ○ First implementation of NuDEX nuclear de-excitation hadronic model. This is an optional, alternative and more sophisticated model for the emission of gammas and internal conversion electrons during the de-excitation of nuclei. ○ New class G4XTRGaussRadModel, providing improved account on the origin of transition radiation X-rays. ○ Build option with VecGeom requires VecGeom-1.2.8 or higher.

	○ Requires CLHEP-2.4.7.1 for external CLHEP installation. ○ New versions of datasets: G4PARTICLEXS-4.1, G4EMLOW-8.6. ○ New optional datasets: G4NUDEXLIB-1.0, G4URRPT-1.0.
ML4EP	● The 2 Quests for NGT have been selected. They should start in September ● Following LHCC recommendation, we will organise a meeting with ML experts from experiment in September/October to collect input from experiments on common ML activities such as a the framework for training and optimizing ML models.
CernVM	● Major disruption in the Stratum-1 operations last week. ○ At the end of May RAL Stratum-1 servers were migrated from physical hosts to virtual infrastructure, which was not suitable for the workload. Due to the use of a network filesystem the replication of repositories fell behind and finally had to be taken offline. ○ However the RAL Stratum-1 servers initially still accepted connections without responding with the correct error code, degrading the experience for all CVMFS clients (needing to wait for a timeout on RAL when mounting). Thankfully the RAL admins quickly responded to our requests to return the correct error response, allowing for proper failover. ○ The RAL-LCG2 CVMFS Stratum-1 has been temporarily removed from the global CVMFS configuration repository. RAL is rebuilding the Stratum-1 service with physical hardware, coordinating with other Stratum-1 operators. ○ Already had a post-mortem meeting with RAL Tier-1 Manager yesterday ● One summer student and one openlab student arrived and started their projects ● Preparations for 2.12

Stacks	• Created LCG_106
	  ◦ ROOT 6.32/02, Python 3.11, not for CentOS7
	  ◦ LCG_106_ATLAS_1,2,3,4
	• Created LCG_105c
	  ◦ ROOT 6.30/08
	  ◦ LCG_105c_LHCB_Core,7
	• Cuda 12.4.1 available in contrib and ATLAS layers 3,4
	• Gcc14 stack might be better working tomorrow
	• Python 3.12 progressing, but not the entire Python ecosystem is ready to drop distutils
	• Disabled most, if not all, CentOS7 builds, migrated other projects (VecGeom, AdePT) to Alma9 CI
	• Ready to move to parallel CVMFS publication of nightly builds, no change in directory structure

Related Projects & IT	
RCS-ICT TC/SC	•
XRootD	• XRootD 5.7.0 released on July 1st.

EOS	•

HSF	• New Steering Group chair has been elected - Graeme Stewart
	  ◦ SG has met several times and is now progressing on the evolution we discussed with the community at the DESY workshop (seminar series, advisory board, activity restructuring)
	  ◦ Seminar series will run in the same time slot as the Compute and Accelerator Forum, 16h30 CE(S)T on Wednesdays
	• PyHEP is this week - successful online format, with many interesting talks and discussions
	• PyHEP.dev registration is still open until 14 July, Aachen 26-30 August
	• JuliaHEP registration and abstract submission are now open, @CERN 30 September - 4 October (2 days of plenary, 3 days of hackathons in IdeaSquare)
	• Training events
	  ◦ 8-9 July - HSF/IRIS-HEP Software Basics Training (Virtual)
	  ◦ 16 July - HSF/IRIS-HEP Python for Analysis Training (Virtual)
	  ◦ 25-27 September - Julia for HEP Tutorial

CERN openlab	• The summer students have all arrived and the programme has been kicked off also with the lectures. Many thanks to supervisors and lecturers participating. This year we observed an unusual (very high) number of applicants. • We are negotiating a new openlab agreement with Oracle. There will likely be an activity on Anomaly Detection in low-latency environments with Atlas and CMS.
IT R&D	• Working towards the Madgraph LO release. Fixing many bugs. Discussing with CMS about their tests.

EP R&D	• Next meeting Reconstruction Tracking, 17 July
AIDAinnova	• ntr

Stakeholders feedback	
ALICE	• Ongoing migration to ROOT 6.32.02. Ongoing migration to GCC 13.2.x. Ongoing debugging of aarch64 builds.

ATLAS	• Updating the main branch of Athena to ROOT 6.32/02 this week
	  ◦ Discovered that reading of ROOT files produced in 6.32/02 in earlier ROOT releases (~6.10 and before) is broken by default.
	  ◦ Contacted ROOT team - workaround provided.
	  ◦ Rebuilding legacy Athena releases to patch earlier ROOT versions is not feasible for operational reasons.
	  ◦ Issue was caught in the CI when updating the ROOT version.
	  ◦ Updated our LCG dev nightlies to catch such issues before ROOT releases are cut in future.

CMS	• Nothing additional to report that hasn't been mentioned already in other recent meetings. Note that some developers are on vacation or travelling during this period.
LHCb	• Delayed testing of ROOT 6.32 because we are migrating to HepMC3 at the same time • Found DD4hep bug in use of alignments in Geant4 ◦ Fix in ROOT master and DD4hep will need an update of LCG 106

CLIC	• NTR
FCC	• FCC Week in San Francisco ○ Fruitful software session, good advertisement of what exists, constructive feedback (particularly from Scott Snyder)

AOB
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Action Items:

Minutes:

- Giulio: For ROOT, it would be useful to have migration notes for deprecated features.
- Andrea: the list of MC generators in Predrag's slides is not complete, for instance POWHEG is missing. This should be cross checked against the MC community before it goes to any official bodies like LHCC
- Andrea: in Predrag's slide on EP-SFT, HSF and generators, it would be useful to clarify that there is a big difference, EP-SFT has committed CERN funding, while the generators depend on several teams outside CERN. "Stochastically" we always managed to get the right people to work on the right generators, but there is no central funding commitment, like for GEANT4/ROOT in SFT.